Lec. 6

29/10/2016

→ 3 chapters

Contents

* General Concept of NN.
* Architecture of NN — i/p layer → hidden layers → o/p layer

hidden layers:
- ≥ 1 → multilayer preception
- = 0 → single preception (only i/p & o/p layers)

- weights - Bias (threshold)

(بنعدل خطوات لحد ما نوصل للأحسن) NN weights

↳ For example in Classification

O → △ ✗

O → ▢ ✗

activation function

$net_i = f(x \cdot w) b$ → O ✓

$= \Sigma$ – –

threshold. Ex in recognition

A → x_1 →

B → x_2 → o/p

C → x_3 –

Say A مثلاً → على الـ weight

عند الـ A الناتج هو ... وغيره الاحتمالات

_ energy function

E → T − O (distance)

↳ في الأول بنبدأ بـ initial random weights ← small values وبتغير

في الـ w فيتغير الـ E ← $\frac{\partial E}{\partial w}$ → min.

↳ gradient decent (or) momentum

_Learning rate
* Back Propagation NN.
* ReCurrent NN.
* Hopfied NN.

midterm?

بس بنقی عارفین الConcept بتاعهم لحد دلوقتي

(Pattern recognition)

Face Recognition by using NN

→ direction of face (R, L, U, D) Right left up down

→ person P.A, P.B, P.C

Face Recognition:

a Science based on image processing

image → [image processing] → Features
↳ for example in any person

Features:
- Color
- Shape
- age
- length
- :

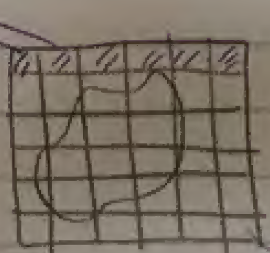
main Procedures:

- Capture the image
- Image enhancement
- Features Extraction ✓✓
  ↳ i/p for NN
- Features Selection (Significant feature)
  (علشان كل ما يزيد هيزود ال Processing time).

Ex	A	B
Feature	150cm	151cm
	White	Black
	25yrs	50yrs

not a significant one (مش هتفرق) ← 150cm / 151cm

pixels
↓
intensity of pixel
↓
high → W
low → B



500 pixels (Say)

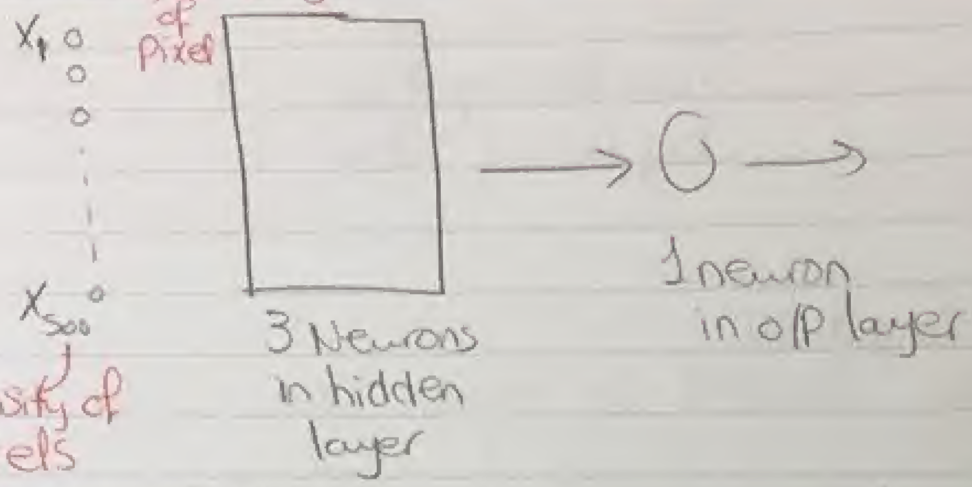
0 ←→ 255
Black — White

$$\begin{bmatrix} 0 & 0 & 0 & 1 & \dots \\ 0 & 0 & 0 & 1 & \\ 0 & 0 & 0 & 1 & \end{bmatrix} \Rightarrow R, \quad \begin{bmatrix} 1 & 0 & 0 & 1 \\ 1 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 \end{bmatrix} \Rightarrow Left$$

no. of pixels → recognition (U or D or L or R)

(500 i/p neuron , 1 o/p neuron)

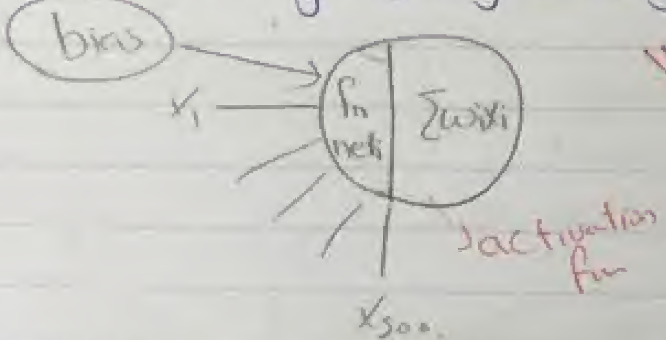
↳ intensity of pixel



1) Training (initialization of w, - - -)

↳ learning → by an Algorithm (BPNN Algorithm)

⇓ Supervised



2) Validation → data set اختار بصورة من ال

3) Test → data set بصورة خارج ال "

up → down False

up → up True

up → Right False

from some equations (no. of F & no. of T - - -)

we can calculate confusion matrix & then the accuracy (metrix) ل مش مطالبين بتعلمها

Classification between a car and a van.

① Features extraction
- weight
- length
- non. of wheels
- Size

no. of i/p neurons = no. of Features

no. of o/p neurons = 1. (one decision)

② Training & learning.